ENTOMOLOGICAL NEWS

OCTOBER 1958

Vol. LXIX **No. 8**

CONTENTS

Evans—Nesting behavior of Larropsis distincta 197

Hungerford and Matsuda—Teratobates a synonym 200

Scott—New records for Proisotoma frisoni 202

Parfin—Bionomics of Mantispidae 203

Dreisbach—Three new species of Haploneurion 207

Alexander—Undescribed western crane-flies XVIII 215

Frost—Ecological insect survey of Pennsylvania 222

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: H. J. GRANT, JR., E. J. F. MARX, M. E. PHILLIPS, and J. A. G. REHN.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS: Communications and remittances to be addressed to **Entomological News, 1900 Race Street, Philadelphia 3, Pa.**

ADVERTISEMENTS: Rate schedules available on request. Address, **Fred B. Jacobson, Advertising Manager, Entomological News, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. Articles longer than eight printed pages may be published in two or more installments, unless the author is willing to pay the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

ILLUSTRATIONS: Authors will be charged as follows: For text-figures, the cost of engraving; for insert plates (on glossy stock), the cost of engraving plus printing. Size limit, when printed, 4×6 inches. All blocks will be sent to authors after printing. It is not advisable to print half-tones as text-figures.

TABLES: The cost of setting tables will be charged to authors.

SEPARATA: Members of the American Entomological Society may elect to receive, gratis, 25 offprints of their contributions. These will be "run-of-form," without removal of extraneous matter.

Those members desiring more than 25 separates, and all non-members, will receive no gratis copies. They must obtain all their separates (as reprints, with extraneous matter removed) from the printer at the prices quoted below. Authors must place their order for such separates with the editor at the time of submitting manuscripts, or when returning proof.

Copies	1–4 pp.	5–8 pp.	9–12 pp.	13–16 pp.	17–20 pp.	Covers
50	$3.95	$6.33	$ 9.89	$10.28	$13.44	$4.31
100	4.74	7.51	11.86	12.65	16.21	5.89
Add'l 100	1.58	2.36	3.94	4.74	5.54	3.16

Plates printed one side: First 50, $3.15; Additional 100's, $2.37.

Transportation charges will be extra.

ENTOMOLOGICAL NEWS

VOL. LXIX OCTOBER, 1958 No. 8

Observations on the Nesting Behavior of Larropsis distincta (Smith) (Hymenoptera, Sphecidae)

By HOWARD E. EVANS, Cornell University, Ithaca, N. Y.

Very little has been recorded on the nesting behavior of digger wasps of the genus *Larropsis*. Williams (1913, Kansas Univ. Sci. Bull., 8: 192) found *L. divisa* (Patton) preying upon cave crickets (*Ceuthophilus*) in Kansas. Williams found two nests of this species, one in the bottom of a crack in the earth, the other inside a hole "the size of that made by a mouse." He was unable to dig either nest successfully, but believed that the nest was fairly deep and of several cells. Williams noted that wasps of this genus occur frequently about holes dug by mammals; he believed that they seek cave crickets in these places.

During the summer of 1957, I found an unusually large population of *Larropsis distincta* (Smith) inhabiting a gravel pit near Six-mile Creek, Ithaca, N. Y. On every sunny day many females could be seen hunting prey, and on several occasions females were seen carrying prey to their nests. Nine nests were eventually marked and dug out. The first observations were made on August 26, the last on September 18. All the Ithaca specimens in the Cornell collections were taken between August 9 and September 18. It seems certain that this species has but a single generation a year in the Northeast.

Hunting is done among stones, dried leaves, and low vegetation. The wasps walk along the ground in a circuitous path, entering depressions and accumulations of debris. Any crickets which are flushed are pursued rapidly, but I did not observe capture and stinging. Some of the crickets flushed may be unacceptable to the wasps, as all of the numerous crickets which

I took from wasps or from nests were adult female *Nemobius fasciatus* (DeGeer) [det. A. B. Gurney]. There are also two specimens in the Cornell collection taken at Ithaca by P. P. Babiy with females of this same species of cricket.

After being stung, the crickets are carried to the nest over the ground, the wasp seizing the base of the antennae with its mandibles and proceeding forward, straddling the cricket's body, which is dorsum-up. Occasionally the wasp may make a short flying hop or carry the cricket up a plant 10–20 cm. and then fly off heavily with it. The latter behavior occurs most commonly near the nest, and may enable the wasp to obtain a better view of the vicinity of the nest. In the area of study, all nests were situated in relatively bare places in the gravel pit, and it was a common sight to see wasps proceeding over the ground with their prey in a more or less straight line from the litter and low vegetation of surrounding areas into the nesting area. Once in the nesting area, they would circle about and eventually disappear rather suddenly into a hole in the ground.

Without exception, the wasps in this aggregation made their nests from the bottoms of pre-existing depressions in the ground. These depressions were often beneath sticks or dried leaves and in most cases appeared to represent caved-in parts of the burrows of the hairy-tailed mole, *Parascalops breweri* (Bachman). The burrows of the wasps, emanating as they did from the bottoms of these depressions and associated mole tunnels, were exceedingly difficult to trace, and only five of the nine nests marked were dug out with any degree of success. Apparently the wasps take advantage of various natural cavities among the clods and pebbles and do not do very much digging themselves. The cells found varied in depth from 10 to 20 cm., with the majority between 12 and 15 cm. In any one nest the cells tended to radiate out from a common point. Of the five nests dug out successfully, one contained only one cell, one contained two, one three, one seven, and one nine. Doubtless the nests with only a few cells would have eventually contained more. In fact, it is probable that once a wasp has found a suitable hole in the soil it continues to construct cells from the same cavity for as long as it lives.

The cells are rough-walled and somewhat irregular, generally measuring about 1.5 cm. in length. The usual number of crickets per cell is two, but I found a few cells with three and a few with apparently only one cricket. As mentioned above, all crickets were adult female *Nemobius fasciatus*. The egg is laid on the first cricket placed in the cell. It is about 2 mm. long and is placed transversely between the front and middle coxae, with one end pressed against one of the front coxal cavities. The egg hatches in two days and the larva begins to feed through the coxal cavity. As it grows, the larva bends itself around the prothorax of the cricket, like a collar, as it continues to feed through the venter of the thorax. In about three days it consumes the first cricket and then proceeds to consume the remaining one or two crickets more rapidly, finishing the entire contents of the cell about five days after hatching. I have described the full-grown larva elsewhere (1958, Trans. Amer. Ent. Soc. 84: 119–120).

The crickets are paralyzed rather lightly, and until consumed by the wasp larva they often show spontaneous movements of legs and antennae, but are unable to walk about in a co-ordinated manner. The contents of several cells appeared to have been destroyed by mold.

Of 23 cells dug out, no less than 13 contained the maggots of miltogrammine flies. The number of maggots per cell varied from one to six, with the usual number three or four. Without exception the wasp larva failed to develop in these cells. On more than one occasion an intact egg on its cricket was removed from a cell for rearing only to have it destroyed by minute, first-instar maggots within a day or two. Apparently these maggots are deposited beneath the wings or in some other concealed place; later they move onto the egg and destroy it, then consume the crickets and form their puparia in or near the cell.

None of the flies was actually observed larvipositing in the field. The maggots taken from various cells were placed in rearing tins, overwintered outdoors, and brought into the laboratory in March 1958. Emergence of flies was obtained from all five nests. Of 25 flies reared, 14 were *Metopia argyrocephala* (Meigen) and 11 were *Senotainia trilineata* (Wulp) [det.

W. L. Downes, Jr.]. In one case both species emerged from the same nest (no. 1494; 7 *Metopia* and 1 *Senotainia*). However, three cells of this nest had been infested, and I placed all three cells in the same rearing tin. Thus I cannot say whether or not the two species of miltogrammines infested the same cell.

The rather local distribution of wasps of the genus *Larropsis* may be a result of the fact that they require coarse soil containing various natural cavities. It may be that they are attracted to animal burrows more for purposes of nesting than for finding crickets, as Williams suggested. I would judge these wasps to be among the most primitive of Sphecidae in their nesting behavior. At least the practice of using pre-existing cavities in the soil, the light paralysis of the prey, and the manner of carrying the prey over the ground with the mandibles are all usually regarded as primitive traits. A great many more Sphecidae must be studied in detail before one can confidently generalize regarding the evolution of behavioral characters.

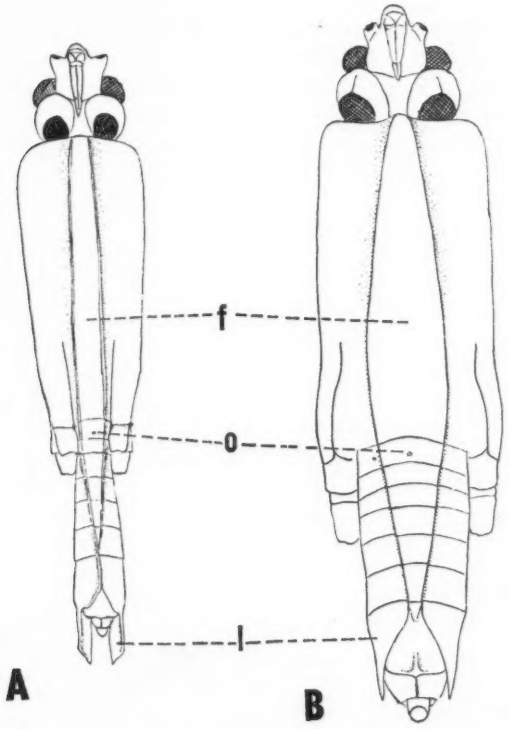
Teratobates Esaki, a Synonym of Heterobates Bianchi (Gerridae, Heteroptera)[1]

By Herbert B. Hungerford and Ryuichi Matsuda,
Department of Entomology, University of Kansas

In 1896 V. Bianchi described *Heterobates* for his *H. dohrandti* (Ann. Mus. Zool. Acad. Sci. St. Petersbourg, 74). We have in our University of Kansas Collections three males and two females of this species kindly sent by Dr. A. N. Kiritschenko many years ago. In our study of the genera and higher categories of the Gerridae we were able to borrow from Dr. W. E. China of the British Museum paratype specimens of *Teratobates bilobatus* Esaki. Dr. Esaki described this species in 1927 (Eos,

[1] Contribution No. 1,018 from the Department of Entomology, University of Kansas. This report is a by-product of a project conducted with the aide of a grant from the National Science Foundation.

Rev. Esp. Ent., 3(3) : 264). These two species are strikingly similar in appearance and we are impressed by the remarkable modification of the thoracic and abdominal venters of the females in both the species (figs. 1 and 2). They are plainly different species but must be congeneric.



The ventral view of (A) *Teratobates bilobatus* Esaki, and (B) *Heterobates dohrandti* Bianchi. o. = Omphalium, f. = longitudinal fold of the thoracic and abdominal venters, l. = lateral lobe of the seventh abdominal segment.

New Locality Records for Proisotoma frisoni, (Collembola, Isotominae)

By Harold George Scott, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta, Georgia

Proisitoma frisoni Folsom can be distinguished from other members of the genus by means of the following diagnostic characteristics: white, eyes absent; postantennal organ elliptical; antenna longer than head; Abd V and VI not fused; ratio of Abd III to IV as 5:6; unguis without teeth; hind unguiculus two-thirds as long as hind unguis, one-half as long on other legs; one tenent hair; furcula present, extending to posterior part of Abd II; length 1.1 mm.

This species was described by Justus Watson Folsom (1937) from Cahokia, Illinois. Since then no records of the species have been published. Two additional records are noted as follows:

1. Taken by C. Clayton Hoff from Berlese funnel sample of mixed aspen-fir litter, 9,700 feet, along Canjilon Road, at divide west of Vallecitos, Rio Arriba County, New Mexico, 13 Aug. 1953 (included in a dissertation presented to the University of New Mexico in partial fulfillment of the requirements for the Degree of Doctor of Philosophy, aided by National Science Foundation Grant G-112).

2. Taken by Jerrold M. Michael from around potted *Ficus elastica* in a private home, Decatur, DeKalb County, Georgia, 21 March 1958. The infestation was eliminated by dusting the plants with 2% chlordane. Since overwatering of potted plants is often a key factor in the development of household infestations of Collembola, it was recommended that, henceforth, the plants be watered only after the soil appeared dry.

Reference

Folsom, J. W. 1937. Bull. U. S. Natl. Mus., 168: 55.

Notes on the Bionomics of the Mantispidae (Neuroptera: Planipennia)

By Sophy Parfin, United States National Museum, Washington, D. C.

Because information on the hypermetamorphic Mantispidae is scarce, it is believed that the following three notes on their bionomics will be of interest. All of the specimens, on which these observations are based, are in the collection of the United States National Museum.

I am grateful to the late J. C. Bridwell (Lignum, Virginia) and G. B. Vogt (Entomology Research Division, U. S. Department of Agriculture) for making certain mantispid specimens available for study; to W. J. Gertsch (American Museum Natural History) for the identification of a spider egg-sac; to J. F. Gates Clarke (Smithsonian Institution) for helpful suggestions in the preparation of the manuscript; to R. E. Crabill (same institution) for providing the approved names of the spiders; to K. V. Krombein (Entomology Research Division, U. S. Department of Agriculture) for supplying the current names of the vespid wasps; and to C. W. Sabrosky and W. W. Wirth (same Division) for the determination of the sarcophagid.

Mantispid Hosts

Three cocoons of the green mantispid, *Mantispa viridis* Walker (tentatively determined until a revision of the Mantispidae is completed; in the genus *Mantispilla,* according to Enderlein's key, 1910, pp. 341–349), in two similar spider egg-sacs, were collected by the late J. C. Bridwell in "late 1951," at Lignum, Virginia, on the underside of a plank buried in grass. The adults emerged "early in 1952," according to Mr. Bridwell. One of the egg-sac halves, containing one cocoon, was sent to Dr. W. J. Gertsch, who kindly identified it as the sac of a spider, *Agelenopsis* sp., prob. *pennsylvanica* Koch, a familiar grass spider in the area. The cocoons, which are approximately 9 mm. long and 7 mm. wide, are composed of a dense, thick, white outer portion (about 1 mm. thick), and a much thinner

and considerably more loosely woven, pale yellow inner lining. The two light gray spider egg-sacs are each about 1.8 cm. in diameter. It was interesting to note that two mantispid larvae were able to complete their development in one spider egg-sac, without one destroying the other.

Host records for the hypermetamorphic Mantispidae are scarce in the literature, and can be summarized as follows:

Host	Mantispid	Reference
Spider egg-sacs and spiders		
Agelena naevia Walckenaer	*Mantispa fuscicornis* Banks as *fusicornis*	Kaston, 1938, p. 147
Arctosa littoralis (Hentz) = *A. cinerea* (Fabricius)	1st stage mantispid larvae	Hungerford, 1939, p. 265
Clubiona sp.	*Mantispa* sp.	Rogenhofer, in Brauer, 1869, p. 833
Cupiennis sallei (Keyserling)	*Mantispa viridis* Walker?	Milliron, 1940, p. 358
Drassodes hypocrita (Simon)	*Mantispa styriaca Poda*	Poujade, 1898, p. 347
Drassid	*Mantispa styriaca Poda*	Main, 1931, p. 26
Lycosa sp.	*Mantispa styriaca Poda*	Rogenhofer, 1862, p. 583
Lycosa inquilina Koch = *Tarentula barbipes*	*Mantispa styriaca Poda*	Brauer, 1869, p. 833
Philaeus militaris (Hentz)	*Mantispa interrupta* Say	Smith, 1934, p. 124
Thomisus sp.	*Mantispa* sp.	Brauer, 1869, p. 834
Vespid wasp nests		
Polybia occidentalis scutellaris (White)	*Symphrasis varia* (Walker)	White, 1841, p. 322; Walker, 1853, p. 212; Smith, 1863, p. 501; Westwood, 1867, p. 506; Hagen, 1877, p. 210; Brauer, 1887, p. 213
Polybia rejecta (Fabricius)? (honey "*bereilenden*" wasp)	*Symphrasis varia* (Walker)	Brauer, 1887, p. 213
	Mantispa sp.	Rogenhofer, 1862, p. 585
Noctuid moth pupae		
Xylomyges curialis Grote	*Plega signata* (Hagen)	Woglum, 1935, p. 119

Brauer (1869, pp. 833–834) observed that the larvae of the Palearctic *Mantispa styriaca* Poda did not appear to like the lenticular green egg-sacs of *Lycosa fluviatilis* Blackwall, but (*loc. cit.*, p. 836) stated that the white, spherical egg-sacs of the following spiders are suitable for rearing the mantispids: *Lycosa inquilina* Koch = *Tarentula barbipes* (Sundevall), *Arctosa allodroma* Koch = *A. cinerea* (Fabricius) and *Dolomedes* Latreille.

Longevity in the Mantispidae

A female of *Mantispa viridis* was kept alive by the writer for a period of eighty-one days, dying on December 17. It was collected in flight just before dusk by Mr. G. B. Vogt as it was about to alight on a hop hornbeam tree near a rock outcrop located at an angle between Difficult Run, Virginia, and the Potomac River on September 28, 1955. No insects other than a small roach nymph, which was rejected, were offered to the mantispid, but bits of fruit such as peach, plum, grapes and cucumber were placed near the top of the small jar (2½ oz.) in which the specimen was confined. It was not seen to feed on the fruit, although it appeared attracted, even reaching for the fruit with its forelegs. Water was splashed on it daily, and grass and chickweed kept in the jar. It was frequently seen to pass its forelegs and tarsi through its mouth. The day before death, it fell into about ¼" water, which had accumulated in the jar from the daily splashings, and after it was rescued, it became inactive and died the next day. Upon dissection, a moderate amount of fat was found next to the body wall of the abdomen, but eggs were not apparent.

The above longevity record for an adult mantispid in captivity is greater than that of Hungerford (1936, p. 70), who was able to keep a female of *M. interrupta* Say alive sixty-seven days, from July 19 to September 24, by giving it "a few drops of water each day and a housefly or other insect for food." Milliron (1940, p. 359) fed a mantispid (from Central America?), which was tentatively determined as *viridis,* ten to fifteen drosophilid flies between October 30th and November 7th, when the mantispid died. Thus it is seen that *M. viridis* may overwinter as an adult in its natural habitat. Smith (1934, p. 124) suggested that *M. interrupta* and *M. sayi* may overwinter as adults because some were taken in October in Kansas. Viets (1941, pp. 70–71) reared an adult of *M. interrupta* from an egg. The parent was collected in the summer in Michigan and the adult offspring emerged two months and five days after the egg was laid. This might indicate hibernation by the adult. Brauer (1869, p. 833), however, after approximately sixteen

years of research, found that the Palaearctic *styriaca* Poda overwintered as a larva and did not seek a spider egg-sac until spring. Main (1931, p. 26) made similar observations on *styriaca*.

Sarcophagid Invader of a Mantispa

A sarcophagid larva (Diptera, Sarcophagidae), approximately 3 mm. long, identified by W. W. Wirth and C. W. Sabrosky, was found by the writer in the abdomen of a male of *M. interrupta* from Victoria, Texas, when it was dissected. It is not known whether the mantispid was alive or dead when the sarcophagid entered.

Literature Cited

Brauer, F. 1869. Beschreibung der Verwandlungsgeschichte der *Mantispa styriaca* Poda und Betrachtungen über die sogennante Hypermetamorphose Fabre's. Verh. k.k. Zool. bot. Ges. Wien, 19: 831–840, pl. 12.

——. 1887. Beitrag zur Kenntnis der Verwandlung der Mantispiden-Gattung *Symphrasis* Hg. Zool. Anz., 10: 212–218, figs. 1–4.

Enderlein, G. 1910. Klassifikation der Mantispiden nach dem Material des Stettiner Zoologischen Museums. Stett. Ent. Zeit., 71: 341–379, 4 figs.

Hagen, H. 1877. *Symphrasis*, eine neue Mantispiden-Gattung. Stett. Ent. Zeit., 38: 208–211.

Hungerford, H. B. 1936. The Mantispidae of the Douglas Lake, Michigan, region, with some biological observations (Neurop.). Ent. News, 47: 69–72; 85–88, pl. 1.

——. 1939. A note on Mantispidae. Bull. Brooklyn Ent. Soc., 24: 265.

Kaston, B. J. 1938. Mantispidae parasitic on spider egg sacs. Jour. New York Ent. Soc., 46: 147–152, pl. 12.

Main, H. 1931. A preliminary note on *Mantispa*. Proc. Ent. Soc. London, 6: 26.

Milliron, H. E. 1940. The emergence of a Neotropical Mantispid. Ann. Ent. Soc. America, 33: 357–360.

Poujade, G. A. 1898. Observation sur les moeurs de *Mantispa styriaca* Poda. Bull. Soc. Ent. France, 3: 347.

Rogenhofer, A. 1862. Beitrag zur Kenntniss der Entwicklungsgeschichte von *Mantispa styriaca* Poda (*pagana* Fab.). Verh. k.k. Zool. bot. Ges. Wien, 12: 583–586.

SMITH, F. 1863. Descriptions of Brazilian honey bees belonging to the genera *Melipona* and *Trigona*, which were exhibited, together with samples of their honey and wax, in the Brazilian court of the international exhibition of 1862. Trans. Ent. Soc. London (ser. 3), 1: 497–512, pl. 12.

SMITH, R. C. 1934. Notes on the Neuroptera and Mecoptera of Kansas, with keys for the identification of species. Jour. Kansas Ent. Soc., 7: 120–145, 1 pl.

VIETS, D. 1941. A biological note on the Mantispidae (Neuroptera). Jour. Kansas Ent. Soc., 14: 70–71.

WALKER, F. 1853. List of the specimens of Neuropterous insects in the collection of the British Museum. Part 2: 212–213 (476 pp., London).

WESTWOOD, J. O. 1867. Descriptions of new species of Mantispidae in the Oxford and British Museums. Trans. Ent. Soc. London (ser. 3), 5: 501–508.

WHITE, A. 1841. Description of a South American wasp which collects honey. Ann. Mag. Nat. Hist., 7: 315–322, 1 pl.

WOGLUM, R. S. 1935. *Symphrasis signata* Hagen. Pan-Pacific Ent., 11: 119.

Three New Species of Haploneurion Kohl (Hymenoptera: Psammocharidae) from Chile

By R. R. DREISBACH, Midland, Michigan

Townes, in his paper [1] on the Nearctic wasps of the Subfamilies Pepsinae and Cerapalinae, places the species of this Genus and those of the Genus *Sphictostethus* Kohl in the Genus *Priocnemis* Schiødte. The writer cannot agree with this. Both of these Genera have outstanding characters which are distinctly different from those in *Priocnemis*. These differences are even greater than is usual between genera. The following key for the *females* (no males are known for the Genus *Haploneurion*) will show these differences.

1. Fore wings with *two* cubital cells; second recurrent vein meets second cubital cell from about *apical fifth* to slightly apicad of the second intercubital vein; second intercubital vein strongly bowed outward on anterior third, the second cubital

[1] Townes, H. 1957. U. S. Nat. Mus. Bulletin 209.

cell as long on cubitus as on marginal vein; third discoidal cell five-sided; no lobe in rear wings; marginal cell extends beyond second cubital cell by about 0.4 of its length; wings covered with setae; submedian cell in rear wing very narrow and short, reaches only 0.3 of the distance from base of wings to transverse vein; in the fore wings the transverse vein apicad of the basal vein by two to three times the length of the transverse vein; the wings very small, but probably functional, barely reaching apex of first tergite; no teeth whatever on posterior tibiae; eyes do not reach the vertex; pronotum almost as long as mesonotum or longer; scutellum prominent, almost three-fourths as long as mesonotum, postscutellum very short, metapostnotum very long, as long as scutellum and in genotype longer than mesonotum, with many very fine transverse ridges; propodeum smooth and rounded, swollen just at the slope; a large sharp tooth on claws, almost parallel to the apical ray.....*Haploneurion* Kohl

1. Fore wings with *three* cubital cells; second recurrent vein meeting the third cubital cell about the *basal* third; third discoidal cell four sided; an anal lobe to rear wings; teeth present on posterior tibiae, very strong or weak; pronotum not as long as mesonotum or if so thorax constricted behind the pronotum; metapostnotum not so long or if almost so thorax constricted and wings with three cubital cells; eyes reach the vertex or if not then three cubital cells and thorax constricted.....2
2. Thorax constricted just back of pronotum, pronotal shoulders *much enlarged;* a very large mesopleural tooth just at the rise above the middle coxae; propodeum with dorsal surface flat, very long, parallel-sided, posterior slope almost at right angles to the dorsal surface; eyes do not reach the vertex; wings small, hardly reaching to basal third of abdomen, but functional, the transverse vein in fore wings apicad of basal vein by *almost twice* its length; teeth on posterior tibiae small; tibiae hairy between teeth.....*Sphictostethus* Kohl

2. Thorax not constricted, pronotal shoulders *not* enlarged; *no* mesopleural tooth, not even a swelling; propodeum slope without a differentiation between dorsal and posterior parts, not parallel-sided; very short, not rough; eyes reach vertex; wings normal or in one case very small *not* functional, the transverse vein in fore wings apicad of the basal vein by *much less* than twice its length; posterior tibiae generally strongly toothed, not strongly hairy between the teeth, or sometimes slightly so.....*Priocnemis* Schiødte

Haploneurion chilensis, n. sp.

Holotype female: The sides of the thorax behind the pronotum to the apex of propodeum, the mesosternum, the first tergite (except a narrow apical edge and a large spot back of base, reddish), the extreme apex of second tergite, and a little more than basal one-half of third tergite, black; the rest of body, including all the legs, a reddish yellow; first five joints of antennae same reddish color as body, the apical seven joints darker, dull ferrugineus; ratio of lengths of first four and last two joints are as 50:20:50:50:40:35; third joint of antennae almost five times as long as wide; inner orbits parallel, very slightly convergent at apex; eyes almost reach the vertex, the latter in a smooth curve above the eyes; ocelli small, of equal size, in a very small triangle; lines connecting the inside of the fore ocellus with the inside of each lateral, form an acute angle with each other; lateral ocelli 0.8 as far apart as their diameter, and about 3. as far from eyes as each other; when seen from side there is a prominent depression between base of antennae and base of clypeus; clypeus very slightly convex and from the rise above the groove is almost flat to apex, but sloping a little; posterior orbits rather wide, and vertex and front just back of antennae visible above the eyes; interocular distance at the widest part is 0.60 of trans-facial distance; clypeus slightly more than twice as wide as long; length of second and third antennal joint is 0.8 the distance between the eyes at vertex; width of head not quite 1.1 as long as length; the lateral ocelli in front of a line connecting the top of eyes; lateral ocelli three times as far from eyes as each other; pronotum in a low curve from neck and widest just above fore coxae; ratio of length of pronotum, mesonotum, scutellum, postscutellum, metapostnotum, and propodeum are as 25:40:25:10:30:150; the metapostnotum transversely striate; basal one-third of propodeum almost flat and in one plane, from there in a smooth low curve to apex, swollen on sides at and widest about the middle; abdomen widest at apex of second tergite, more shining than rest of body, last two segments with numerous, upright, golden hairs, directed apically; a medium, impressed, transverse groove on second sternite; wings very

short, reaching to apex of first tergite, hyaline, whitish concolorous; only two cubital cells; the second recurrent vein meeting second cubital cell about its apical 0.15, second intercubital vein bowed outward in its anterior third; second cubital cell almost as long on marginal as on cubital vein; third discoidal five-sided, its outer vein perpendicular to the third discoidal cell, the latter not extending beyond the cell; second discoidal cell very narrow; in fore wings the transverse vein apicad of the basal vein by two times the length of transverse vein; legs practically free of spines, no trace of teeth on posterior tibiae; ratio lengths of joints of posterior legs starting with femora are as 190:190:140:70:50:30:35 (without claw); a very large tooth on claws just beyond center with broad base and sharp point, almost parallel with the apical ray, much heavier than the apical ray; a fairly large arolia between claws; length head and thorax 4.3 mm.; abdomen 4.5 mm.; fore wing 4.2 mm.; rear wing 3.2 mm.

Holotype female: CHILE, Thorcy, 1867 (MCZ).

Paratype female: Corral, Chile, T. Barbour (RRD).

Haploneurion bullocki, n. sp.

Holotype female: The neck, sides of the pronotum, the sides of rest of thorax, all of the metapostnotum, almost all of the posterior slope of the propodeum, the base, sides and posterior half of first tergite, the anterior sides of second tergite (the apical half darkish with some yellowish), the basal three-fourths of the third and a semicircular basal spot on fourth tergite, black; the rest of body, including the legs, bright reddish yellow, except the eyes and ocellar triangle are black; the mouth parts and last ten joints of antennae are also blackish; when seen from the front the vertex rises in a smooth curve, and extends above eyes about width of eyes; the ocelli small, less than their diameter apart, and the laterals about 10 times as far from eyes as each other; the lines touching insides of rear and fore ocelli forming a very acute angle; diameter of ocelli 0.8; distance between the posterior ocelli 0.3; distance between the fore ocellus and the laterals 0.8; distance between the eyes and lateral ocelli 30

(these lengths on same scale as rest of dimensions); a groove from fore ocellus to between antennae, the anterior orbits almost parallel; when seen from the side the front completely raised above eyes, the highest point just at base of antennae, as high as one-half width of eye; antennae long and slender, the lengths of first four and apical two joints are as 50:20:70:60:40:40; fourth, fifth, and sixth joints of antennae slightly excavated at base underneath; clypeus arched and with a hairless rim; cly-

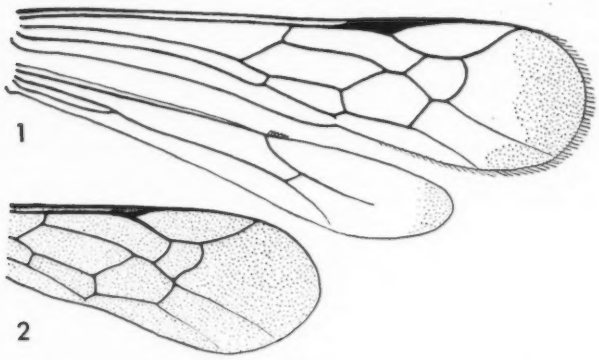


Fig. 1. *Haploneurion bullocki* n. sp. fore and rear wings.
Fig. 2. *Haploneurion minus* Kohl fore wing.

peus two and one-half times as wide as long; interocular length is equal to 0.6 transfacial distance; interocular distance at vertex equal to 0.9 interocular distance at antennae; the distance between eyes at vertex as long as length of second and third antennal joints; head as wide as long; front and clypeus with golden prostrate pubescence; pronotum rising rather sharply from neck; lengths of thoracic segments are: pronotum 50; mesonotum 50; and scutellum postscutellum 10; metapostnotum 20; propodeum 130; the metapostnotum is finely, closely, transversely striated; pronotum bulging just above the fore coxa and the propodeum bulging (widest) just posterior to the slope; body

golden prostrate-pubescent pretty well all over, but more strongly so on apical third of second tergite, and even more so on most of third tergite; ratio of joints of posterior leg beginning with femora: 245:250:160:80:60:30:45 (without claw); a broad based rather sharp tooth on apical three-fourths of claw, parallel to apical ray; second recurrent vein meets second cubital cell at apical fifth; second recurrent vein bowed outward on anterior third; the length of second cubital cell on cubitus equal to its length on medius between first intercubital and second intercubital veins; third discoidal cell five-sided; median vein does not extend beyond third discoidal cell nor does the subdiscoidal vein extend beyond this cell; basal vein in fore wings basad of transverse by three times the length of transverse vein; the marginal cell extends beyond second cubital cell by 0.4 of its length; wings covered with setae; no anal lobe on rear wing; in rear wings submedian cell very small only 0.3 of distance from base of wing to transverse median; anal cell very narrow; tip of fore wings beyond marginal cell blackish, rear wing concolorous; length of fore wing 4.1 mm., rear wing 3.3 mm. (the fore wing reaches to about apex of first tergite); length of head and thorax 6.2 mm., length thorax 3.3 mm., length abdomen 4.0 mm.

Holotype female: Nahuelbuta, Angol, CHILE. 11–4–57 R. Acuna (MCZ).

Haploneurion nitidus, n. sp.

Holotype female: The sides and ventral surface of the thorax behind the pronotum to the apex of thorax, the basal three-fourths or more of first tergite and the basal three-fourths of third tergite, black; the rest of body, including all legs and all of antennae, a reddish yellow; ratio of lengths of first four and last two joints of antennae are as: 50:20:70:65:40:45; eyes slightly convergent, interocular distance at clypeus 90 compared to 110 at vertex; interocular distance at widest part of head is 0.6 of transfacial; head as long as broad; clypeus slightly more than twice as wide as long; ocelli separated from each other by

their diameter and the lateral ocelli three times as far from eyes as each other; the distance between the eyes at vertex is equal to length of second and third antennal joints; ratio of lengths of pronotum, mesonotum, scutellum, postscutellum, metapostnotum are as 60:50:30:10:25:120; propodeum about like *chilensis;* abdomen shining without the prostrate golden pubescence of *chilensis;* the second recurrent vein meeting the second cubital cell at about its apical third; second cubital cell two-thirds as long on marginal vein as on cubital vein; in fore wings the transverse vein is apicad of basal vein by two times length of transverse vein; ratio of lengths of joints of posterior legs are as: 260:270:190:90:70:40:50 (without claw); length head and thorax 6.6 mm., abdomen partly broken, fore wing 3.7 mm., rear wing 3.5 mm.

Holotype female: CHILE, E. C. Reed (U.S.N.M.).

Paratype female: Pucon, Chile, P. Herbst (MCZ).

Key to Genus Haploneurion Kohl—Females

1. Head, antennae, and legs (beyond trochanter) are yellow; thorax and abdomen black; wings black; second recurrent vein meeting the second cubital cell just apicad of the second intercubital vein, almost interstitial but definitely apicad.... .....*minus* Kohl
1. Head, antennae, and legs (including coxae) all yellow, thorax and abdomen mostly yellowish, wings yellowish hyaline....2
2. Brilliant, glistening, golden patches of pubescence on outside of fore coxae, sides of pronotum, dorsal surface of propodeum, central apex of first tergite, spots on sides and apices of tergites two and three, on sides of propodeum just above second and third pair of coxae, and the clypeus and sides of face; wings completely yellowish; metapostnotum very long, one-half length of propodeum; mesopleura, propodeum and ventral part of thorax black; second recurrent vein meets the second cubital cell much beyond middle of cell but not as far out as apical fifth.....*apogonum* Kohl
2. The brilliant, glistening, golden patches of pubescence of *apogonum* not present; metapostnotum not nearly as long as in preceding species.....3
3. Ocelli less than their diameter apart and the lateral ones *ten times* as far from eyes as each other; third antennal joint

longer than the first or fourth; distance between the eyes at vertex equal to the length of second and third antennal joints; basal vein in fore wings basad of transverse vein by three times length of latter; second recurrent vein meets second cubital cell at apical fifth; second and third tergites with prostrate golden pubescence.....*bullocki* n. sp.

3. Ocelli about their distance apart and the lateral ones about *three times* as far from eyes as each other; if prostrate pubescence on second and third tergites it is thin, not strongly golden and not very noticeable.....4

4. Third tergite shining, no pubescence; second recurrent vein meeting second cubital cell at apical third; second cubital cell about two-thirds as long on marginal vein as on cubital vein; basal vein in fore wings is basad of transverse by two times length of latter.....*nitidus,* n. sp.

4. Third tergite not shining, but pubescent; second recurrent vein meeting second cubital cell at apical 0.15; second cubital cell about as long on radius as on cubitus; basal vein in fore wings basad of transverse vein by twice length of latter.....*chilensis,* n. sp.

These species are all from Chile. This new species is named in honor of Dr. D. S. Bullock, a missionary in Chile, who has sent a great many new species of insects to the museums of the United States.

I wish to thank Mr. Steyskal of Detroit for his kindness in making the drawing of the wings.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part XVIII

By CHARLES P. ALEXANDER, Amherst, Massachusetts *

The preceding article under this general title was published in ENTOMOLOGICAL NEWS, 69: 129–136, 1958. Most of the species discussed at this time were collected by the writer, the types being preserved in the Alexander Collection; one interesting crane-fly from Arizona was taken by the late J. August Kusche and is in the collection of the California Academy of Sciences.

Limonia (Limonia) kuschei new species

Belongs to the *eiseni* group; mesonotal praescutum dark chestnut brown with a broad obscure yellow central stripe; pleura dark chestnut brown; wings tinged with brown, patterned with darker, *Sc* long; male hypopygium with the posterior border of the tergite emarginate; gonapophysis with mesal-apical lobe broad, its apex obliquely truncated; aedeagus broad, apex conspicuously bilobed.

♂. Length about 6.5 mm.; wing 7.5 mm.; antenna about 1.3 mm.

Rostrum and palpi black. Antennae black, apex of pedicel paler; flagellar segments passing from oval to elongate, each with one very long verticil. Anterior vertex narrow, light silvery; posterior part of head dark brown.

Cervical region brownish black. Pronotum yellow above, dark brown on sides; pretergites and dorsopleural membrane yellow. Mesonotal praescutum dark chestnut brown with a broad obscure yellow central stripe that represents the confluent median and very reduced lateral areas; scutal lobes chestnut

* Contribution No. 1291 from the Entomological Laboratory, University of Massachusetts.

I wish to express my deepest thanks and appreciation to the authorities of the American Philosophical Society and the National Science Foundation for financial assistance in conducting field studies on Western North American Tipulidae in 1955 and 1956.

brown, narrowly bordered by dark brown, median area gray pruinose; scutellum brownish black; mediotergite brownish black with a gray central area that does not reach the posterior border. Pleura dark chestnut brown. Halteres with stem dusky, knob dark brown. Legs with the coxae and trochanters obscure yellow; femora obscure brownish yellow, tips darker brown, extreme genua vaguely whitened; tibiae and tarsi light brown, outer tarsal segments brownish black; claws long and slender, with a single very long spine before midlength. Wings tinged with brown, patterned with darker brown, including areas at origin of *Rs*, fork of *Sc*, cord and outer end of cell *1st* M_2; distal ends of outer radial cells darkened; vague subhyaline areas before and beyond origin of *Rs* and beyond the subcircular brown stigma; veins brown. Venation: *Sc* long, Sc_1 ending about opposite two-thirds the length of *Rs*, Sc_2 near its tip; *Rs* square at origin; *m-cu* shortly before fork of *M*.

Abdomen dark brown, outer dististyle of male hypopygium pale. Male hypopygium with the tergite transverse; posterior border emarginate, forming two broadly rounded lobes, each with about fifteen long setae. Basistyle with the ventromesal lobe short and stout. Dorsal dististyle straight, apex suddenly decurved to a point, surface glabrous. Ventral dististyle small, its total area about two-thirds that of the basistyle; rostral blade very large, spines widely separated, accessory tubercle at base of the prolongation with the usual pair of very long setae. Gonapophysis with the mesal-apical lobe stout, blackened, apex obliquely truncated to appear slightly bilobed. Aedeagus broad, apex conspicuously bilobed.

Habitat. ARIZONA. *Holotype:* ♂, Rustler Park, Chiricahua Mountains, Cochise County, 8,000–9,000 feet, July 28, 1927 (J. A. Kusche).

The species is named for the collector, Mr. J. August Kusche, who collected numerous Tipulidae in California, Arizona and in the Pacific Islands. The most similar Nearctic species is *Limonia* (*Limonia*) *rara* (Osten Sacken) which agrees well in the general appearance and venation, differing conspicuously in the structure of the male hypopygium.

Limonia (Limonia) indigena loloensis new subspecies

♂. Length about 9.5 mm.; wing 9 mm.

Antennae with the first flagellar segment yellow, succeeding two or three indistinctly bicolored, the incisures pale, outer segments more uniformly darkened. Thorax light yellow; pronotum broadly blackened medially; intermediate praescutal black stripes very narrowly separated by a ground line, lateral stripes very pale to subobsolete; scutal lobes with solid brownish black centers; scutellum dark brown, narrowly yellow on central part; mediotergite dark brown. Pleura and pleurotergite yellow, the brown transverse girdle on anterior mesepisternum pale brown, inconspicuous. Legs yellow; femora with a narrow brown terminal ring; remainder of legs brownish yellow, terminal tarsal segments brownish black. Wings much as in the typical subspecies but with the dark pattern even more reduced, including the stigma and the darkened washes in the cubital and anal cells. Abdominal tergites chiefly obscure yellow, the sides broadly dark brown, the dark pattern expanded behind; sternites clear yellow, the extreme lateral borders darkened, especially on the cephalic portions. Male hypopygium with the dististyle much stouter than in typical *indigena,* the length about twice the greatest width; apex produced into a single spine, with a more obtuse denticle on lower margin back from the tip. Tergite with the median notch very shallow or lacking.

Habitat. IDAHO. *Holotype:* ♂, Powell Ranger Station, along Lochsa River, Lolo National Forest, Idaho County, June 24, 1956 (Alexander).

The general coloration of the body and wings in the present fly is much more as in the eastern Nearctic *Limonia* (*Limonia*) *indigena* (Osten Sacken) than in the Rocky Mountain race *L.* (*L.*) *indigena jacksoni* (Alexander). It may be noted that the aedeagus of the latter is conspicuously setuliferous whereas it is glabrous in typical *indigena.* The condition in the present fly cannot be stated due to the condition of mounting of the hypopygium of the unique type. It seems probable that all three forms here discussed will eventually be found to represent distinct species.

Limnophila (Phylidorea) nevadensis new species

Allied to *snoqualmiensis;* mesonotum almost uniformly fulvous or fulvous yellow, pleura light yellow; femora of all legs yellow with a very narrow pale brown subterminal ring; wings tinged with very pale yellow, stigma dark brown; abdomen brownish yellow, segments seven and eight black to form a conspicuous ring, hypopygium light yellow; male hypopygium with the tergal lobes paired; filaments of aedeagus long and slender; basal gonapophysis a slender blade, its tip subacute.

♂. Length about 9.5–10 mm.; wing 9.5–10 mm.; antenna about 1.9–2.1 mm.

Rostrum dark brown; palpi black. Antennae with scape black, pedicel light yellow; basal flagellar segments obscure yellow, the outer ones darker; verticils conspicuous. Head light gray.

Pronotum slightly infuscated above, yellowed on sides. Mesonotal praescutum and scutum almost uniformly fulvous or fulvous yellow, in cases somewhat darker medially but otherwise unpatterned; scutellum more testaceous; postnotum very vaguely pruinose; in fully colored specimens, including the holotype, a capillary pale brown central vitta on mediotergite and, in cases, involving virtually the whole mesonotum. Pleura and pleurotergite light yellow. Halteres with stem pale yellow, knob weakly darkened. Legs with the coxae and trochanters light yellow; femora yellow, with a very narrow pale brown subterminal ring, subequal in extent to the pale tip; tibiae obscure yellow; tarsi gradually darkened, the outer segments dark brown. Wings tinged with very pale yellow, the prearcular and costal fields more evidently so; stigma dark brown, conspicuous; veins dark brown. Venation: *Rs* relatively short, about twice R_{2+3+4}, more or less angulated near origin; veins R_3 and R_4 divergent, cell R_3 at margin from about one-third more to nearly twice as extensive as cell R_2; cell M_1 longer than its petiole; *m-cu* at or shortly before midlength of cell *1st* M_2.

Abdomen brownish yellow, segments seven and eight black, forming a conspicuous ring; hypopygium light yellow, base of

ninth sternite darkened. Male hypopygium with the tergal lobes small, paired. Filaments of aedeagus long and slender, much longer than in brevifilosa. Basal gonapophysis a narrow slender blade, shorter and stouter than in *snoqualmiensis,* the tip subacute.

Habitat. NEVADA. *Holotype:* ♂, East side of Lake Tahoe, Ormsby County, 6,800 feet, July 3, 1953 (Alexander). *Paratopotypes:* 4 ♂♂; *paratypes:* Spooners Summit, Douglas County, July 3, 1953 (Alexander). The type was taken along a small stream flowing into Lake Tahoe, described in detail in my field notes as Station No. 2.

The most similar described species is *Limnophila* (*Phylidorea*) *snoqualmiensis* Alexander, of the Pacific Northwest, which differs especially in the pattern of the legs and wings and in slight differences in the structure of the male hypopygium. The types of *snoqualmiensis* have the darkened pattern of the fore legs very extensive but other specimens that appear to be conspecific have it more restricted.

Molophilus (Molophilus) arapahoensis new species

Belongs to the *gracilis* group, *pubipennis* subgroup; size large (wing of male 6 mm.); general coloration of mesonotum dark brownish gray, scutellum testaceous yellow; antennae short, flagellum black; legs brownish black, only the femoral bases restrictedly obscure yellow; wings weakly suffused, macrotrichia of veins long and conspicuous, dark brown; male hypopygium with the apical lobe of the basistyle relatively long and slender; outer dististyle broad, with microscopic spinulae over the entire surface; phallosomic plate broad, outer half narrowed, apex subacute.

♂. Length about 6 mm.; wing 6 mm.; antenna about 1.4 mm.

Rostrum and palpi black. Antennae short; scape brown, flagellum black; flagellar segments long-oval to subcylindrical, verticils of the more basal segments very long. Head dark gray.

Pronotum brownish gray; scutellum and pretergites restrictedly light yellow. Mesonotal praescutum and scutum dark

brownish gray, without clearly defined pattern; pseudosutural foveae pale brown; scutellum obscure testaceous yellow, postnotum brown. Pleura brown. Halteres obscure yellow. Legs with the coxae and trochanters brownish yellow, the posterior pair clear yellow; remainder of legs brownish black, only the femoral bases restrictedly obscure yellow. Wings subhyaline to weakly suffused, prearcular field slightly more yellowed; veins brownish yellow, macrotrichia long and conspicuous, dark brown. Venation: Vein R_2 lying beyond level of *r-m*; petiole of cell M_3 about twice *m-cu*; vein *2nd A* strongly sinuous on outer half, ending distinctly beyond the level of *m-cu*.

Abdomen dark brown, the hypopygium only slightly brighter. Male hypopygium with the apical lobe of the basistyle relatively long and slender, subequal in length to the outer dististyle, tip narrowly obtuse; ventral lobe with about 30 spicules. Outer dististyle broad and flattened, the apex bent laterad into a spine; entire surface of style with microscopic spinulae, those near the base smaller; inner style longer, strongly bent at near midlength, terminating in an acute point, with relatively few spines, including a single outer one before the tip and a scattered series of four or more spines along the lower edge, the outer ones smaller. Phallosomic plate broad basally, the outer half strongly narrowed, apex subacute; disk of plate with microscopic setulae, the margins glabrous.

Habitat. COLORADO. *Holotype:* ♂, Milner Pass, Rocky Mountain National Park, Grand County, 10,730 feet, July 19, 1955 (Alexander).

Although evidently allied to other western Nearctic species, as *Molophilus* (*Molophilus*) *kulshanicus* Alexander and *M.* (*M.*) *spiculatus* Alexander, the present fly appears to be quite distinct in the diagnostic characters above listed, especially the structure of the male hypopygium, particularly the outer dististyle and phallosome. All members of the *pubipennis* subgroup of the genus are unusually difficult to determine and exact relationships still are insufficiently known.

Molophilus (Molophilus) dirhaphis new species

Belongs to the *gracilis* group, *nitidus* subgroup; general coloration of body, legs and antennae black; knobs of halteres light yellow; wings strongly darkened; *m-cu* long, very oblique, slightly angulated; male hypopygium with the tergal furcula very shallowly notched; basistyle with the dorsal spine very long and slender; mesal spines two, long and slender; inner dististyle relatively short and stout.

♂. Length about 5.5–6 mm.; wing 5–5.6 mm.; antenna about 1.2–1.3 mm.

Rostrum and palpi black. Antennae black throughout, relatively short; segments oval, shorter than the verticils. Head black.

Thorax entirely black, subnitidous to nitidous. Halteres with stem dusky, knobs light yellow. Legs black throughout. Wings strongly darkened; veins dark brown. Venation: R_{2+3} long, R_2 and basal section of R_5 nearly in transverse alignment or the former more distal in position; petiole of cell M_3 short, less than the very oblique to slightly angulated *m-cu;* vein *2nd A* long, ending about opposite the fork of M_{3+4}.

Abdomen black throughout. Male hypopygium of the type of *nitidus,* differing from all previously described species in structure. Notch of the tergal furcula very shallow, gently emarginate to subtruncate. Basistyle with the dorsal spine very long and slender, extended distad to beyond the level of the apices of the dististyles; mesal spines two, very long and slender. Inner or simple dististyle much shorter and stouter than in *nitidus.*

Habitat. CALIFORNIA. *Holotype:* ♂, Castle Crags State Park, Shasta County, 2,000 feet, July 7, 1953 (Alexander). *Paratopotypes:* 2 ♂♂ on a single pin, July 8, 1953.

Molophilus (*Molophilus*) *dirhaphis* is quite distinct from the five other regional members of the *nitidus* subgroup. It is most similar to *M.* (*M.*) *nitidus* Coquillett in the elongate mesal spines of the basistyle. In *nitidus* the tergal fork is deep and conspicuous and there is a single mesal spine.

The Ecological Insect Survey of Pennsylvania

By S. W. Frost, The Pennsylvania State University

Having retired from the Pennsylvania State University as of October 1, 1957, the writer feels that it is his duty to summarize the results of Project 1077 of the Agricultural Experiment Station known as, The Ecological Insect Survey of Pennsylvania. He hopes this project will continue and bring forth greater results. An extensive report, now in preparation, will give the origin and purpose of this project, describe Pennsylvania as an ideal ecological unit for such studies, and will list all publications dealing chiefly with Pennsylvania insects. This will constitute part one of the survey.

A large part of the survey is based on the insects which have been assembled by the writer during the past thirty-nine years when he was associated with the Pennsylvania State University. The accumulation of this material has been chiefly a one-man job, without a curator or preparator, and as a side line along with teaching, research and other duties.

Numerous small collections of insects have been purchased or received as gifts. The Bureau of Plant Industry, Harrisburg, donated duplicate Lepidoptera from the Charles S. Anderson collection. Mr. C. A. Thomas turned over his collection of Coleoptera. The Reading Museum donated duplicate Lepidoptera, chiefly exotic material. We have acquired other groups of insects, the J. O. Pepper collection of Homoptera and Hemiptera, the W. W. Long collection of Lepidoptera, chiefly from Western Pennsylvania, and the J. M. Geddes collection, chiefly Sphingidae.

The insect collection comprises approximately 10,000 correctly identified species and between 40 and 50 thousand specimens. It is housed in 47 steel cabinets and 546 U. S. National Museum insect drawers, using the tray system.

This collection is not large but represents a good beginning. It is especially strong in the following groups of which the number of Pennsylvania species and outstanding authorities who have worked on them are indicated. Collembola 27 Ken-

neth Christiansen, Orthoptera 150 V. R. Haber, Neuroptera, Hemerobiidae 10 F. M. Carpenter, Ephemerida 85 Isaac Aurelio, Odonata 103 George H. Beatty, Thysanoptera 22 Louis Stannard, Homoptera, Psocidae 18 Kathryn Somerman, Aphidae 300, Cicadellidae 196 and Hemiptera 290 J. O. Pepper, Coleoptera 782 J. N. Knull, W. W. Boyle, W. W. Sanderson, Henry Dietrich and F. Werner, Mecoptera 21 J. O. P. Brown, Trichoptera 111 Cornelius Betten, Lepidoptera 193 Wm. T. M. Forbes and J. G. Franclemont, Diptera 615 S. W. Bromley, E. T. Cresson, F. C. Harmston, Maurice T. James, L. L. Pechuman, R. B. Priddy, G. W. Sabrosky and Alan Stone, Hymenoptera 272 W. G. Bodenstein, William Brown, H. E. Evans, T. B. Mitchell, Louis Stannard and Grade Sandhouse. These figures do not represent the total number of insects in the collection. For example, there are 1,323 species of Coleoptera and 934 species of Lepidoptera from Pennsylvania.

Records of every correctly identified Pennsylvania species are entered on special $8\frac{1}{2} \times 11$ sheets. These records include date of collection, locality, collector, authority for determination, number of specimens in the collection and other important ecological information. In addition similar records of species in other outstanding collections of the state have been added to the files. There are more than 15,000 records of Pennsylvania insects.

The Insect Survey of Pennsylvania has led to numerous publications. Most of these are brief reports of a preliminary nature. Two comprehensive manuscripts have been completed, "The Odonata of Pennsylvania" and "The Tabanidae of Pennsylvania." Both summarize the species in all the collections of the State. Many new records are added and much ecological data is given. These are the first reports ever to be prepared on any of the larger groups of insects of Pennsylvania. In addition to the above manuscripts, a description of the Insect Survey of Pennsylvania, as mentioned previously, is in preparation. These contributions will be published as parts I, II and III of the Ecological Survey of Pennsylvania.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleign, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspy, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

Important Mosquito Works

MOSQUITO ATLAS. Part I. The Nearctic Anopheles, important malarial vectors of the Americas, and Aedes aegypti and Culex quinquefasciata

MOSQUITO ATLAS. Part II. The more important malaria vectors of the Old World: Europe, Asia, Africa and South Pacific region

By Edward S. Ross and H. Radclyffe Roberts

Price, 60 cents each (U. S. Currency) with order, postpaid within the United States; 65 cents, foreign.

KEYS TO THE ANOPHELINE MOSQUITOES OF THE WORLD

With notes on their Identification, Distribution, Biology and Relation to Malaria. By Paul F. Russell, Lloyd E. Rozeboom and Alan Stone

Mailed on receipt of price, $2.00 U. S. Currency. Foreign Delivery $2.10.

For sale by the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

Just Published

New Classified Price Lists

Available separates from the TRANSACTIONS OF THE AMERICAN ENTOMOLOGICAL SOCIETY and ENTOMOLOGICAL NEWS, and all titles of the Society's MEMOIRS have been catalogued by author in twelve special price lists in the following categories:

Coleoptera	**Neuroptera and Smaller Orders**
Diptera	**Odonata**
Hemiptera	**Orthoptera-Dermaptera**
Hymenoptera	**Arachnida and Other Classes**
Lepidoptera	**Bibliography-Biography**
Memoirs	**General**

Lists will be mailed free upon request. Please state specifically which list or lists you require.

The American Entomological Society
1900 RACE STREET
PHILADELPHIA 3, PENNSYLVANIA

Just Published

MEMOIRS OF THE AMERICAN ENTOMOLOGICAL SOCIETY

Number 15

251 pages of text, 19 pages of tables, 7 maps, 47 plates, 3 pages of contents and index

THE NEOTROPICAL SPECIES OF THE 'SUBGENUS AESCHNA' SENSU SELYSII 1883 (Odonata)

By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna, Coryphaeschna,* and *Castoraeschna, Aeshna* in its turn being subdivided into the subgenera *Aeschna, Hesperaeschna, Rhionaeschna, Schizuraeschna, Marmaraeschna* and *Neureclipa.* These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna,* 1 species of *Schizuraeschna,* 1 species of *Neureclipa* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

Price $10.00 postpaid

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 RACE STREET, PHILADELPHIA 3, PA.